Appendix 6: Conversion Factors and Calculations used in Forestry

Distance Factors

1 mile = 5,280 feet	½ mile = 2,640 feet	¼ mile = 1,320 feet	1/10 mile = 528 feet
1 mile = 1,760 yards	½ mile = 880 yards	¼ mile = 440 yards	1/10 mile = 176 yards
1 mile = 80 chains	½ mile = 40 chains	¼ mile = 20 chains	1/10 mile = 8 chains

NOTE: 1 chain = 66 feet; 1 yard = 3 feet

Area Factors

1 acre = 43,560 square feet
1 square mile = 640 acres
NOTE: A football field is approximately 1.3 acres in area

To Determine Acres of an Area: Step 1: Multiply the LENGTH feet (x) WIDTH feet.
Step 2: Take this answer and divide it by 43,560.
For Example: *A log deck is 85 feet wide and 170 feet long. (85 x 170 = 14450)*
14450 ÷ 43560 = 0.33 acre in size

Acres Table for Road, Trail, or Deck Size

Length in Feet	Width in Feet							
	10	12	15	20	35	50	75	100
25	0.006	0.007	0.009	0.011	0.02	0.03	0.04	0.06
50	0.011	0.014	0.02	0.02	0.04	0.06	0.09	0.11
75	0.02	0.02	0.03	0.03	0.06	0.09	0.13	0.17
100	0.02	0.03	0.03	0.05	0.08	0.11	0.17	0.23
125	0.03	0.03	0.04	0.06	0.10	0.14	0.22	0.29
150	0.03	0.04	0.05	0.07	0.12	0.17	0.26	0.34
175	0.04	0.05	0.06	0.08	0.14	0.20	0.30	0.40
200	0.05	0.06	0.07	0.09	0.16	0.23	0.34	0.46
250	0.06	0.07	0.09	0.11	0.20	0.29	0.43	0.57
500	0.11	0.14	0.17	0.23	0.40	0.57	0.86	1.15
750	0.17	0.21	0.26	0.34	0.60	0.86	1.29	1.72
1000	0.23	0.28	0.34	0.46	0.80	1.15	1.72	2.30
1250	0.29	0.34	0.43	0.57	1.00	1.43	2.15	2.87
1500	0.34	0.41	0.52	0.69	1.21	1.72	2.58	3.44
1750	0.40	0.48	0.60	0.80	1.41	2.01	3.01	4.02
2000	0.46	0.55	0.69	0.92	1.61	2.30	3.44	4.59
2500	0.57	0.69	0.86	1.15	2.01	2.87	4.30	5.74
5000	1.15	1.38	1.72	2.30	4.02	5.74	8.61	11.48
5280	1.21	1.45	1.82	2.42	4.24	6.06	9.09	12.12

Calculating *Percent (%) Slope* of Existing Land Surface

To determine the **percent slope of existing** roads, trails, or the land surface:

Measure the vertical elevation and divide by the horizontal distance. For example:

- A skid trail has an 8-foot change in elevation over a horizontal distance of 55 feet.
- Therefore, 8 ft ÷ 55 ft = 0.145. Multiply your answer x100. The % slope for this example is 14.5%.

Percent (%) Slope of Existing Surfaces

Vert.	Horizontal Distance										
Elev.	10	15	20	25	33	50	66	75	100	150	200
1	10%	7%	5%	4%	3%	2%	2%	1%	1%	1%	1%
2	20%	13%	10%	8%	6%	4%	3%	3%	2%	1%	1%
3	30%	20%	15%	12%	9%	6%	5%	4%	3%	2%	2%
4	40%	27%	20%	16%	12%	8%	6%	5%	4%	3%	2%
5	50%	33%	25%	20%	15%	10%	8%	7%	5%	3%	3%
6	60%	40%	30%	24%	18%	12%	9%	8%	6%	4%	3%
7	70%	47%	35%	28%	21%	14%	11%	9%	7%	5%	4%
8	80%	53%	40%	32%	24%	16%	12%	11%	8%	5%	4%
9	90%	60%	45%	36%	27%	18%	14%	12%	9%	6%	5%
10	100%	67%	50%	40%	30%	20%	15%	13%	10%	7%	5%
12	-	80%	60%	48%	36%	24%	18%	16%	12%	8%	6%
14	-	93%	70%	56%	42%	28%	21%	19%	14%	9%	7%
16	-	107%	80%	64%	48%	32%	24%	21%	16%	11%	8%
18	-	-	90%	72%	55%	36%	27%	24%	18%	12%	9%
20	-	-	100%	80%	61%	40%	30%	27%	20%	13%	10%

Calculating *Slope:Ratio* for Grading & Construction

Slope ratio for grading and construction is measured as the horizontal 'run' over its vertical 'rise'.
This is *opposite* of the more common practice to measure the "% slope" as shown in the above table.

- Slope ratio is expressed mathematically in a way so that the second digit (the 'rise') is 1.
- In other words, a 2:1 slope ratio has a 2 feet 'run' distance-factor for every 1 foot of 'rise' height.
- A 2:1 slope [horizontal run is only 2x the rise height] is steeper than a 4:1 slope [run is 4x the rise].
- Therefore, steeper slopes have a smaller first digit in the ratio, than do flatter slopes.

As a forestry example:

A road's side / cut bank is graded across a horizontal 'run' distance of 6 feet, with a vertical 'rise' height of 4 feet.
This side / cut bank therefore has a slope of 6/4, expressed as a ratio **1.5 : 1** (from 6 ÷ 4).

Percent (%) Slope Example

8 feet ÷ 55 feet = 0.145
                    x 100
                    14.5% slope

8ft elevation

<<<< 55ft distance >>>>
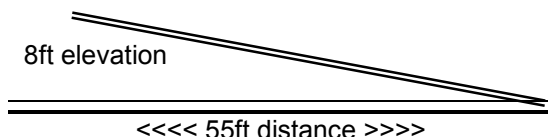
Slope:Ratio Example

The 6 foot run divided by 4 foot rise = 6/4,
                    or expressed as a ratio of 1.5:1

4ft rise

<<6ft run>>   Road